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High Efficiency, High Density, PolyPhase Converters for High Applications

Wei Chen

Introduction

As logic systems get larger and more complex, their supply current requirei Systems requiring 100A are fairly common. A high current power supply tc requirements usually requires paralleling several power regulators to allevi: the individual power components. A power supply designer is left with the these paralleled regulators: brute-force single-phase or smart PolyPhase™. interleaves the clock signals of the paralleled power stages, reducing input : current without increasing the switching frequency. The decreased power lc input capacitor and the low switching losses associated with MOSFETs at ı frequencies help achieve high power conversion efficiency. The size and cc capacitors are also greatly reduced as a result of input ripple current cancell ripple current cancellation also occurs, lower value inductors can be used. ˜ dynamic response to load transients. A combination of lower current rating inductance also allows the use of smaller-sized, low profile, surface mount multioutput applications, PolyPhase converters may also provide the benefi capacitors.

Previously, the implementation of multiphase designs was difficult and exp complex timing and current-sharing requirements. The newly developed L1 problems for high current, single output designs, while the LTC1628 addre: applications. Both ICs are dual, current mode, PolyPhase controllers that cε synchronous buck stages simultaneously. The features of the LTC1629 incl differential amplifier for true remote sensing, low impedance gate drives, c overvoltage protection, optional overcurrent latch-off and foldback current LTC1629 can be configured for 2-, 3-, 4-, 6- and 12-phase operation with a signal (high, low or open). Optimizing the number of phases can help achie most cost-effective power supply design.

This application note analyzes the performance of PolyPhase converters an for selecting the phase number and designing a PolyPhase converter using t following questions will be answered as the discussion goes on:

•How much do I gain by using a PolyPhase architecture? •How many phase application? •How do I design a PolyPhase converter?

How Do Polyphase Techniques Effect Circuit Performance?

In general, PolyPhase operation improves the large signal performance of a converter, by such means as reducing ripple current and ripple voltage. A s converter is used as an example in this application note to analyze the effec techniques on circuit performance.

High current outputs usually require paralleling several regulators. The sing not feasible because of the unacceptable thermal stress on the individual po Paralleled regulators are synchronized to have the same switching frequenc frequency noise at both the input and output terminals. Based on the phase the paral

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